the particle carried will increase sixty-four-fold. When the waste gases pass down the uptakes with a high velocity they will not make a sharp turn at the cinder pocket, but will impinge upon its bottom, unless a considerable depth is provided. The formula of Yesmann, giving the trajectory of the jet of flame in the furnace, may be modified to give the distance vertically downward a flowing jet of gas will penetrate a cooler medium, as follows:

Metric:

$$2g \qquad tn-$$

English units: $H \wedge f-$

The temperature of the gases leaving the heating chamber, t_m, is 1600° (2912° F.) and *U,* the temperature of the gases in the cinder pocket, is assumed as 1400° (2552° F.). The velocity of the waste gases in the gas and air uptakes has already been determined as 17 m 83 (58.5 ft) and 11 m 32 (37.14 ft) per second, respectively. When these values are substituted in the above formula, the following values of *H* will be found:

in gas cinder pocket ff=16 m 94 (55.58 ft)
in air cinder pocket #= 6 m 83 (22.41 ft)

Naturally, if the temperature of the immobile gases in the cinder pocket is lower than it is assumed to be, the penetration of the jet will be less as the difference in temperature increases. But reducing the velocity of the waste gases will decrease the value of *Hj* according to the ratio of the squares of the velocity.

Both McKune and Egler have attacked this problem and produced head constructions which bring the air and the gas together in a rational manner at the incoming end and provide for an increased area of uptake at the outgoing end. Both of these methods are radical departures from previous head con-struction. The writer has devised a method of

obtaining a similar result and at the same time presenting the possibility of adjusting the angle of the flame.

A large segmental air-port over a smaller gas-port is a construction much favored in American furnaces. The high gas velocity and the low air velocity result in a long flame. It was also considered that this form of port produced a blanket of cooler